NASA SBIR/STTR Technologies

E1.03-9368 - Miniaturized Variable-Pressure Scanning Electron Microscope

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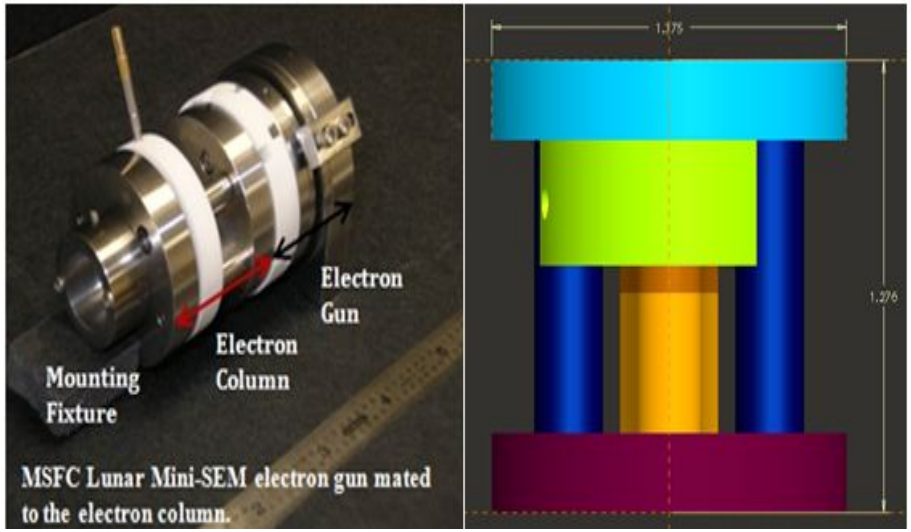
Identification and Significance of Innovation

Need to Develop New On-Orbit Analysis Capabilities. This need arises because of the high cost associated with returning samples to Earth for analysis, the limited availability of crew time, and the relatively modest capabilities and interfaces of the existing hardware on the Space Station.
Project Description. The goal of this project is the development of a miniature variable pressure scanning electron microscope that can be rapidly developed, space-qualified, and deployed on the Space Station. The MVP-SEM is a cross-cutting tool for in-situ topographical imaging and compositional x-ray fluorescence mapping of uncoated conductive and non-conductive samples useful to multiple disciplines, including: non-destructive imaging of inorganic and organic materials; surface contamination analyses; and scientific studies.
Highly Qualified Team. Our team will leverage previous NASA investments in the component technologies to efficiently achieve the project goal.



Estimated TRL at beginning and end of contract: (Begin: 3 End: 5)

Technical Objectives and Work Plan

Technical Objectives
* Confirm MVP-SEM system requirements
* Select and confirm MVP-SEM system technology
* Select optimal auxiliary technologies
* Finalize overall system design

Work Plan
Task 1. Determine Specifications
Task 2. Design Electron Gun and Focusing Column
Task 3. Design Sample Chamber and Vacuum System
Task 4. Develop Conceptual System Design
Task 5. Manage and Report

NASA Applications

The MVP-SEM will provide the ISS with a cross-cutting tool for in situ topographical imaging and compositional X-ray fluorescence mapping of uncoated conductive and non-conductive samples useful to multiple disciplines. It will be able to carry out geological and astrobiological scientific studies on Mars. It would be able to efficiently operate in all environments listed in the Planetary Decadal Survey.

Non-NASA Applications

Portable or Backpack SEM. This would be a laboratory quality, highly portable scanning electron microscope for use in the field or even remote locations. Weight, robustness, and low power consumption of the SEM are all necessary for use in terrestrial and non-terrestrial applications.

Firm Contacts

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